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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/694,172	10/28/2003	Kazuyoshi Ueno	Q78176	2754

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EXAMINER
TSOY, ELENA

ART UNIT	PAPER NUMBER
1762	

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05/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/694,172	UENO ET AL.	
	Examiner	Art Unit	
	Elena Tsoy	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 April 2007* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7 and 9-17* is/are pending in the application.

4a) Of the above claim(s) *1-5 and 12-17* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7 and 9-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Amendment

Amendment filed on April 19, 2007 has been entered. Claims 6 and 8 have been cancelled. Claims 1-5, 7, 9-17 are pending in the application. Claims 1-5, 12-17 are withdrawn from consideration as directed to a non-elected invention.

Specification

1. Amendment to the specification have been entered. A substitute specification in proper idiomatic English and in compliance with 37 CFR 1.52(a) and (b) is no longer required.

2. Objection to the specification as failing to provide proper antecedent basis for the claimed subject matter has been withdrawn due to amendment.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Rejection of claims 7-11 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention has been withdrawn due to amendment.

Claim Objections

5. Objection to claim 8 because of the informalities has been withdrawn due to amendment.

6. Objection to claim 5 has been withdrawn as being directed to a non-elected invention.

7. Objection to claim 8 under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim has been withdrawn due to cancellation of the claim.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 6180523).

Lee et al are applied here for the same reasons as set forth in paragraph 9 of the Office Action mailed on 11/27/2006. Lee et al teach that a first barrier layer 34 (claimed diffusion prevention layer) on an adhesion layer 28 (See column 5, lines 60-61), wherein the adhesion layer 28 is ***preferably*** composed of polysilicon or amorphous silicon (See column 8, lines 15-17) formed by **LPCVD** (See column 8, line 26). It is well known in the art that polysilicon is deposited with LPCVD using **silane *decomposition***. Therefore, the first barrier layer 34 (claimed diffusion prevention layer) would contain Si because it would further diffuse into the diffusion prevention layer under the heat of LPCVD and/or under heating treatments that are always included in ULSI wiring manufacturing process.

10. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al in view of Neary (US 4424805) and Vullaume et al (Applied Physics Letters, vol. 69, pages 1646-1648, 1996) described by Wada et al (US 20050056828).

Lee et al are applied here for the same reasons as above. Lee et al fail to teach that an adhesion layer between said first insulating layer and said diffusion prevention layer is substantially made of silane compound layer (Claim 10) such as a monomolecular layer of a silane compound layer containing an amino group (Claim 11).

Neary teaches that organo silicon monomers which characteristically possess two or more different types of chemical functionality can be used for bonding *dissimilar* materials (See column 5, lines 50-55). For example, silanes may be used for bonding silicon oxide surface by reacting silanol moiety with the surface oxide thus leaving organic functional group, R, extended away from the surface (See column 6, lines 6-19). When R is **amino** group, silane can be bonded to metal surfaces by complexation, coordination or chelation (See column 6, lines 25-30). Therefore, it would be obvious to one of ordinary skill in the art to use amino group containing silane to bond silicon oxide with metal.

Vullaume et al teach that a monomolecular layer of a silane coupling agent functions as a gate insulating film (for example, makes the leakage current satisfactorily small): the leakage current in the monomolecular layer of the silane coupling agent is smaller by 4 to 5 digits than that in silicon oxide having the same thickness (See US 20050056828 to Wada et al, P205) (the Examiner referred to Wada et al (US 20050056828) for description of Vullaume et al).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a monomolecular layer of amino group containing silane coupling agent as an adhesive in Lee et al with the expectation of providing the desired bonding of silicon oxide with metal, as taught by Neary, and the desired satisfactorily small leakage current, as taught by Vullaume et al since Lee et al do not limit their teaching to particular adhesive. It is the

Examiner's position that at least one of Si and carbon of the silane coupling agent would further diffuse into the diffusion prevention layer under heating treatments that are always included in ULSI wiring manufacturing process.

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Shishiguchi (US 5821158) teaches that a **polysilicon** thin film between the substrate and the conductor layer in various processes for manufacturing a semiconductor device such as an ultra large scale integrated (USLI) circuit (See column 1, lines 11-12) is deposited by LPCVD using a **silane**-based gas (See column 2, lines 20-21).

Fung et al (US 5357808) teach that LPCVD polysilicon with 100% silane at 580^0C and at 300 milliTorr (See column 8, lines 26-29).

Bacrania et al (US 5369309) teach that **polysilicon** is deposited on wafer 6001 with LPCVD using **silane decomposition** (See column 40, lines 9-11).

Response to Arguments

12. Applicants' arguments filed April 19, 2007 have been fully considered but they are not persuasive.

(A) Applicants argue that the ULSI wiring recited in claim 7 is patentable over Lee, since Lee does not disclose or suggest at least the diffusion prevention layer containing at least one of silicon and carbon.

The Examiner respectfully disagrees with this argument for the reasons discussed above in paragraph 9.

(B) Applicants argue that Lee does not disclose or suggest at least the diffusion prevention layer containing at least one of silicon and carbon of present claim 7; and further, Neary and Vuillaume do not teach or fairly suggest the diffusion prevention layer containing at least one of silicon and carbon. Thus, Neary and Vttillaurne fail to cure the deficiency of Lee.

The Examiner respectfully disagrees with this argument for the reasons discussed above in paragraph 10.

(C) Applicants argue that there would be no motivation to combine Lee with Neary and Vuillattme since Neary relates to "a solar energy system wherein chemical A is converted into chemical B in the presence of a photo-sensitizer with the absorption of considerable heat..." (See Neary's Abstract); and Vuillattme does not teach or suggest the adhesive that is a monomolecular layer containing an amino group of present claim 11. Vuillaume simply discloses that monolayers of organic molecules form high performance electrically insulating barriers. The Examiner failed to point out where Vuillaume teaches or suggests that organic monolayers may function as an adhesive layer.

The Examiner respectfully disagrees with this argument. Neary teaches that organo silicon monomers containing **amino** group can be used to bond **silicon oxide** with **metal**. Clearly, one of ordinary skill in the art would be motivated to use the silane of Neary for bonding (i.e. as an adhesive) **silicon oxide** with **metal** no matter where they are present.

One of ordinary skill in the art would be motivated to use Vuillaume to form high performance electrically insulating barriers. It is well settled that that rationale different from

applicant is permissible. The reason or motivation to modify the reference may often suggest what the inventor has done, but for a *different purpose or to solve a different problem*. It is not necessary that the prior art suggest the combination to achieve the same advantage or result discovered by applicant. In re Linter, 458 F.2d 1013, 173 USPQ 560 (CCPA 1972) (discussed below); In re Dillon, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990), cert. denied, 500 U.S. 904 (1991).

As was discussed above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a monomolecular layer of amino group containing silane coupling agent as an adhesive in Lee et al with the expectation of providing the desired bonding of silicon oxide with metal, as taught by Neary, **and** the desired satisfactorily small leakage current, as taught by Vullaume et al since Lee et al do not limit their teaching to particular adhesive.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elena Tsoy whose telephone number is 571-272-1429. The examiner can normally be reached on Monday-Thursday, 9:00AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Elena Tsoy
Primary Examiner
Art Unit 1762

May 26, 2007